REMARKS:

1) Referring to paragraph 1 on page 2 of the Office Action we are enclosing a photo copy of both sides of a return receipt postcard on which the receipt of the priority document of German patent publication 19955919.8 is acknowledged. Therefor the Examiner is respectfully requested to search the official file again to see whether the Priority Document is in the official file. Please call us if the Priority Document can not be found.

2) The Examiner's initialing of the IDS form PTO-1449 is sincerely appreciated.

3) The rejection of claims 1, 2, 3, 6 and 9 under 35 USC 103(a) as being unpatentable over US Patent 6,597,800 (Murray et al.) taken in the light of the disclosure of US Patent 6,038,337 (Lawrence et al.) is respectfully traversed for the following reasons. As disclosed in the present specification at the bottom of page 4 and the top of page 5 it is the primary object of the present invention to provide an image analyzing method which is so reliable that simultaneously a multitude of complex objects in any random size image can be recognized from received images.. The invention achieves that object on the basis of evaluating and processing all individual pixels of a received image. The invention achieves multiple object recognition by the combination of steps (a) to (f) of present claim 1 which is summarized as follows:

Step (a) All pixels of received images are classified to separate relevant pixels from irrelevant pixels.

Step (b) The relevant pixels are used to form a reduced image. (Irrelevant pixels are ignored).

Step (c) The reduced image is filtered to form at least two filtered images.

Step (d) The filtered images are further classified by a group of different classifiers, whereby each classifier works on the basis of learned rules and based on a respective characterizing vector to form classified images.

Step (e) The classified images are merged.

Step (f) A decision is made, based on the merged images, whether any of all remaining pixels are still relevant and if so: to which different object class the still relevant pixel belongs.

4) According to the invention, which is pixel based, all pixels of received images are evaluated to eliminate those pixels which are irrelevant for object recognition and to keep only those pixels that are relevant for multiple object recognition and need to be further processed as defined in claim 1. The primary reference US Patent 6,597,800 B1 (Murray et al.) is based on segmentation

of one image as will be explained in more detail below. Similarly, Lawrence et al. is limited to recognizing a single object that has a set of features, by sampling a plurality of local regions of an image. Therefore both the Murray and Lawrence references even if taken in combination do not suggest the evaluation of all pixels for multiple object recognition.

5) Referring specifically to the rejection of present claim 1, it is respectfully submitted that literally reading the language of present claim 1 onto the Murray disclosure does not constitute proof that the language of the claim under examination is supported by the respective Murray disclosure. For example according to the Office Action column 4, lines 22 to 43 of Murray teaches step (a) of present claim 1. However, applicants' respectfully disagree with that conclusion. Segmenting a picture with the help of a "bounding box, binary mask and gray level data for each object" does not teach, much less suggest the evaluation of each individual pixel of a received image. Murray speaks of segmented pixels which form a primary homogenous region which is bounded by the bounding box. The binary mask provides a binary image of the contents of the bounding box where "1" is equivalent to a segmented pixel and "0" is equivalent to a non segmented pixel. Evaluating of grey level data from within the bounding box as taught by Murray does not suggest the evaluation of each and all individual pixels of a received image. Further, forming a reduced image of all the relevant pixels that remain after the rough classification of all the pixels of the received images is

not suggested by extracting information from segmented pixels from one image as taught by Murray.

6) The forming of a reduced image as defined in step b) of present claim 1 is directly dependent on the "relevant pixels" classified out of the received image as defined in present step a). The present "relevant pixels" are not restricted to data from within a bounding box as is the case in Murray.

7) Present step c) calls for filtering each reduced image for forming at least two corresponding filtered images. These at least two filtered images retain the image components relevant for the recognition of more than one object. Thus, according to the invention several different objects can be recognized in the same image. On the other hand segmentation and the use of a Sobel filter taught by Murray limits the Murray system to recognizing one object only in any segmented image region. Thus, Murray does not suggest the production of at least two filtered images based on the initial classification of all pixels of received images.

8) According to present step d) of the invention the at least two filtered images are further classified to provide classified images that are produced by the performance of a group of different classifiers which operate in accordance with learned rules to allocate the classified images to different object classes. Each different classifier of the group of classifiers operates based on a characterizing vector providing specific

input information for its respective classifier. The Office Action acknowledges that Murray et al. neither teach nor suggest the use of a characterizing vector that forms an input information for its respective classifier. However, it is contended in the Office Action that a person of ordinary skill in the art at the time the invention was made could readily use for the purposes of Murray the type of vector that is disclosed in Lawrence.

9) The system of Murray requires a feature vector based on segmented image regions. The feature vector taught by Lawrence is based on dimensionality-reduced sample vectors which are produced by discrete window stepping over the image. Thus the feature vector taught by Lawrence cannot be incorporated in the system of Murray because a feature vector based on segmentation is not the same as a feature vector based on dimensionally reduced sample vectors. Furthermore the system of Murray is restricted to two sequential classifiers each restricted to segmented homogenous image regions which is not equivalent to the method of claim 1 which is pixel-based and combines: rough classification, reduced image formation, filtering, a group of different classifiers, merging and a classification decision. The method of claim 1 does not require segmentation, does not assume homogenous regions, does not require two sequential classifiers and is not restricted to infrared or visible light images as taught by Murray.

10) The method of Lawrence is restricted to an image of a single object to recognize a face (col. 2, lines 60-62). Only one object at a time can be recognized (col. 6, lines 48-53). Filtering of the image is not provided. The method of Lawrence requires the reduction of dimensionality of sample vectors (col. 6, line 53) and only teaches the use of one single classifier (col. 6, lines 66, 67). Lawrence uses all pixels of a local window positioned on the images (col. 4, lines 12 to 26) for defining a feature vector. This feature vector is classified, in order to recognize one object, namely a face. There is no need for using such a vector for the purposes of Murray et al. Hence, those skilled in this art at the time the invention was made would not even consider using the Lawrence vector in Murray et al. According to the invention, instead of the reduction of a feature vector at least two filter images are generated (a), (b), (c), (d) of present claim 1 and a group of classifiers is used. There are no suggestions provided by Murray nor by Lawrence toward the claimed combination.

11) Further with regard to step e) of present claim 1 it should be recognized that Murray performs a primary segmentation by division into one or more primary homogeneous regions of each segment or rather image segment approximating an object of interest. In order to obtain a even greater homogeneity the primary bounding box data are extended to produce subregions of greater homogeneity to form extracted primary data. These primary segmentation steps performed by Murray are compared with data relating to the object in at least one further secondary

segmentation step which also does not amount to any evaluation of all relevant pixels from received images. Thus Murray teaches specific criteria for the generation of a classification choice which requires the input to two classifiers 10 and 22, one classifier receiving the primary data the other classifier receiving the secondary data, please see Figure 1 of Murray. Each classifier is connected in parallel to a respective comparator 11 and 23. These two classifications and comparing according to Murray et al. are supplied to the assessor unit (12) in terms of probability values and in terms of two threshold values for the assessor unit 12. The classification choices are restricted to segmented regions and the classifier 10 works in response to the primary segmentation while the classifier 22 works in response to the following secondary segmentation. Such a procedure is entirely different from the present invention and does not suggest step e) of present claim 1 which does not require any additional probability values or special threshold values.

12) Further, in step e) of present claim 1 the classified images come from the group of <u>different</u> classifiers, which do not rely on secondary segmentation. Present step (e) works in accordance with an algorithm for a combined global evaluation. Such a procedure is not the equivalent of the above described operation of the two classifiers 10 and 22 of Murray et al. Therefore, Murray et al. can not suggest the combination of features as set forth in present claim 1 including the feature of step e). Murray's classification decision is based on primary and

secondary segmentation and thus requires two probability values and two threshold values these values are spelled out at the top of column 6 of Murray. Thus Murray always evaluates segmented regions that need to be homogenous for recognizing an object in a segmented region. Contrary thereto according to step f) of present claim 1 each and every relevant pixel of received images is included in the merged images of step e). These merged images are then subjected in step f) to the decision regarding their relevance. Subjecting each pixel in the merged images for deciding as to which object any relevant pixel belongs is not suggested by the restricted classification decision of Murray as disclosed at the top of column 6 of Murray. The combination of method steps defined in present claim 1 progress from relevant pixels of the received images to allocating object relevant pixels to a respective object whereby several objects can be discerned. This is not possible with Murray's teaching even if Murray is combined with the Lawrence disclosure. Withdrawal of the rejection under 35 U.S.C. §103(a) is respectfully requested.

13) With regard to obviousness it is necessary to judge the invention "as a whole" and not on a separate step by separate step basis. Thus, taking all the steps of present claim 1 as a whole, and comparing the claimed step combination with the entire disclosures of Murray and Lawrence, one reaches the conclusion that using the type of vector as disclosed by Lawrence in the disclosure of Murray would not result in the claimed invention much less would it suggest the claimed invention as a whole. The type of vector disclosed by Lawrence would not be suitable for

the present purposes of evaluating all pixels of received images for multiple object recognition. The Lawrence vectors are also limited to a single object and hence are not suitable for recognizing several objects in a plurality of received images. Therefore, those skilled in the art would not consider using the type of vectors disclosed by Lawrence in the disclosure of Murray.

14) As mentioned above, the method taught by Lawrence is restricted to an image of a single object for example for face recognition, please see column 2, line 48 and column 6, line 48. Lawrence claim 1, line 1 refers expressly to "an object". Lawrence does not teach any filtering. The image representation vector of Lawrence is based on a local window positioned on the image to generate a set of sample vectors. Such teachings are irrelevant for the invention and hence cannot suggest the claimed combination of steps.

15) The rejection of claims 2, 3, 6 and 9 under 35 USC 103(a) is respectfully traversed because again the reading of the literal language of the claims on unrelated passages in the Murray reference results in an examination that does not examine the invention as a "whole". Withdrawal of the rejection of claims 2, 3, 6 and 9 is respectfully requested.

16) The rejection of claims 4 and 7 under 35 USC 103(a) in view of Murray taken in the light of Lawrence and further in the light of US Patent 5,465,308 (Hutcheson et al.) is respectfully

traversed for the following reasons. Claim 4 calls for using different weighting factors that represent different classes of objects to be recognized. These weighting factors are allocated to each relevant pixel point that has been collected from received images. These weighting factors allocate the different relevant pixel points to different objects among a multitude of objects. Such a teaching is not suggested by the "pattern recognition system" of Hutcheson because Hutcheson requires a plurality of images for discovering or recognizing a pattern among these images. According to Hutcheson unique identifier numbers are stored together with the feature vector. In the passages cited in the Office Action regarding the "rank vectors" column 17, lines 46 to 55, it is clear that the weight or importance is allocated to the vectors for ranking of the feature components. Feature components are not individual pixels according to the Hutcheson disclosure. Therefore, combining Hutcheson with Murray and Lawrence does not suggest the invention as claimed in claim 4.

17) The rejection of claim 7 is based on the assumption in the Office Action that Hutcheson deals with individual pixel points. Hutcheson does not work with individual pixels. A system such as Hutcheson's that is based on the use of unique identifier numbers for each of a plurality of images, cannot be compared with the present system that does not use such numbers. According to claim 7 feature vectors are produced on the basis of all pixels of all received images thereby forming rules for the neural network from relevant pixel based feature vectors.

Hutcheson does not use any pixel based feature vectors. Pixel based feature vectors must be distinguished from feature vectors that are based on the highest order magnitude of the power spectrum from the Fourier transformation, please see the abstract of Hutcheson. Hence, the "feature vectors" of Hutcheson are not based on relevant pixels of received images as are the "feature vectors" of present claim 7. Therefore, the combination of the references does not suggest the invention as claimed as a whole in claim 7.

18) The above considerations also apply to claims 8 and 9 when taken as a whole. Hence, their rejection under 35 U.S.C. §103(a) is respectfully traversed.

17) Favorable reconsideration and allowance of claim 1 as amended and of claims 2 to 9 as originally filed are respectfully requested.

Respectfully submitted,

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